HOME OFFICE

CIVIL DEFENCE

THE ATOM BOMB ITS EFFECTS & HOW TO MEET THEM

PART 4

"BLAST"

FILM STRIP C.D. 34

LECTURE NOTES

LONDON : HER MAJESTY'S STATIONERY OFFICE
1953

FILM STRIP CD 34

The Atom Bomb - its effects and how to meet them

Part IV

B L A S T

INTRODUCTION

The most important effect from an air burst atomic bomb is that of blast. It causes widespread damage varying from total devastation to light structural damage up to a distance of two miles.

When it is desired to obtain the maximum effect over the widest possible area, for example an attack on a city, the atomic bomb is likely to be detonated in the air. If the bomb was burst on or near the ground the target area near ground zero would be pointlessly over-devastated.

FRAME

1 The nature of the target must be taken into consideration. The more solid construction of modern cities would call for a lower height or a more powerful bomb than that chosen for buildings of lighter construction as those in Japan.

2 Another important factor which will influence the choice of height of detonation will be the effect obtained by what is called the "Reflected shock-wave".

When an explosion takes place above a reasonably level surface the shock waves are reflected back from the surface as if it were a mirror.

3 The combined waves, original and reflected, join together to form what is called the Mach wave. It is because the reflected wave reinforces the original wave that enhanced blast effects are achieved.

FRAME

4 With an Atomic blast the pressure in an outwards direction lasts for a comparatively long time, so that any structures or parts of structures, that are going to fail will do so before the suction effect of the blast reaches them. The effect is like a very heavy push and will distort steel or reinforced concrete buildings within a radius of about $\frac{1}{5}$ mile from ground zero.

5 Assuming a nominal bomb and that it is detonated at a height of 1,000 ft. we will apply these known effects of blast to several types of buildings at varying distances from ground zero. An average two storey domestic house of brick, a multi-storey brick building, a multi-storey steel framed building and a single storey light steel framed factory with corrugated iron or asbestos sheeting.

6 At about $\frac{1}{2}$ mile from ground zero all these buildings will be demolished.

7 The two storey house will be pushed over and flattened so that the debris lies evenly spread some three feet deep. The multi-storey brick building is the same except that the depth of rubble will be greater. The multi-storey steel framed building will be pushed over, away from ground zero, the brick panels will be blown out, concrete floors broken and the overall depth of debris will be in the order of three feet per Storey height. The factory will suffer much the same but the depth of debris will be less.

8 At $\frac{3}{4}$ mile from ground zero the two storey house will be damaged beyond repair.

9 The multi-storey brick building will also have severe damage, probably beyond repair.

10 The multi-storey steel framed building suffers much less damage, the brick panels facing the explosion will probably collapse.

FRAME

11 The much weaker steel framed factory will suffer heavy damage.

12 At 1½ miles the dwelling house windows will be broken, tiles and chimney pots off, and there will be internal damage.

13 The big brick buildings will have windows broken, tiles missing and internal damage.

14 Steel framed block, will have windows broken and internal damage.

15 The factory will be unharmed but there will be damage to sheeting and glazing.

16 With the bomb burst at 1,000 ft. there would be no crater and no damage from blast to the public utility services under the streets, but collapsing buildings might cause damage to these services.

17 The debris will obviously make rescue work very difficult. Within about ¼ mile from ground zero most streets will be blocked with debris varying from 5-10 ft. in depth, depending on the construction of the buildings and width of the road. This kind of street blockage can be cleared only by heavy mechanical equipment, and is called Category A.

18 From ¼ to ½ mile most streets will still be Category A but some will be (relatively speaking) more easily cleared, this is called Category B.

19 From ½ to ¾ mile some streets will still be Category A, most will be Category B, but some will be open to traffic with some obstruction by tiles, broken glass and lumps of masonry, this is called Category C.

From $\frac{3}{4}$ to 1 mile most streets will be Category C, but a number still in Category B, and from 1 mile outwards most streets will be open except for glass, tiles and other light debris.

20 In all cases the amount of debris in the streets will depend on the direction of the blast as well as on the construction of the buildings. Where a street is at right angles to the blast the debris may cover the whole street, but if it is in line with the blast only the sides of the street may be buried.

21 In some cities there are broad highways leading right into the centre, these will never be completely blocked by debris.

22 If roads are blocked, waterways may provide a useful means of communication, but within a $\frac{1}{4}$ mile of ground zero bridges may be destroyed and the resulting debris would make navigation difficult.

23 A similar debris problem may arise from the collapse of houses into canals.

24 Access to tidal water will also present special difficulties.

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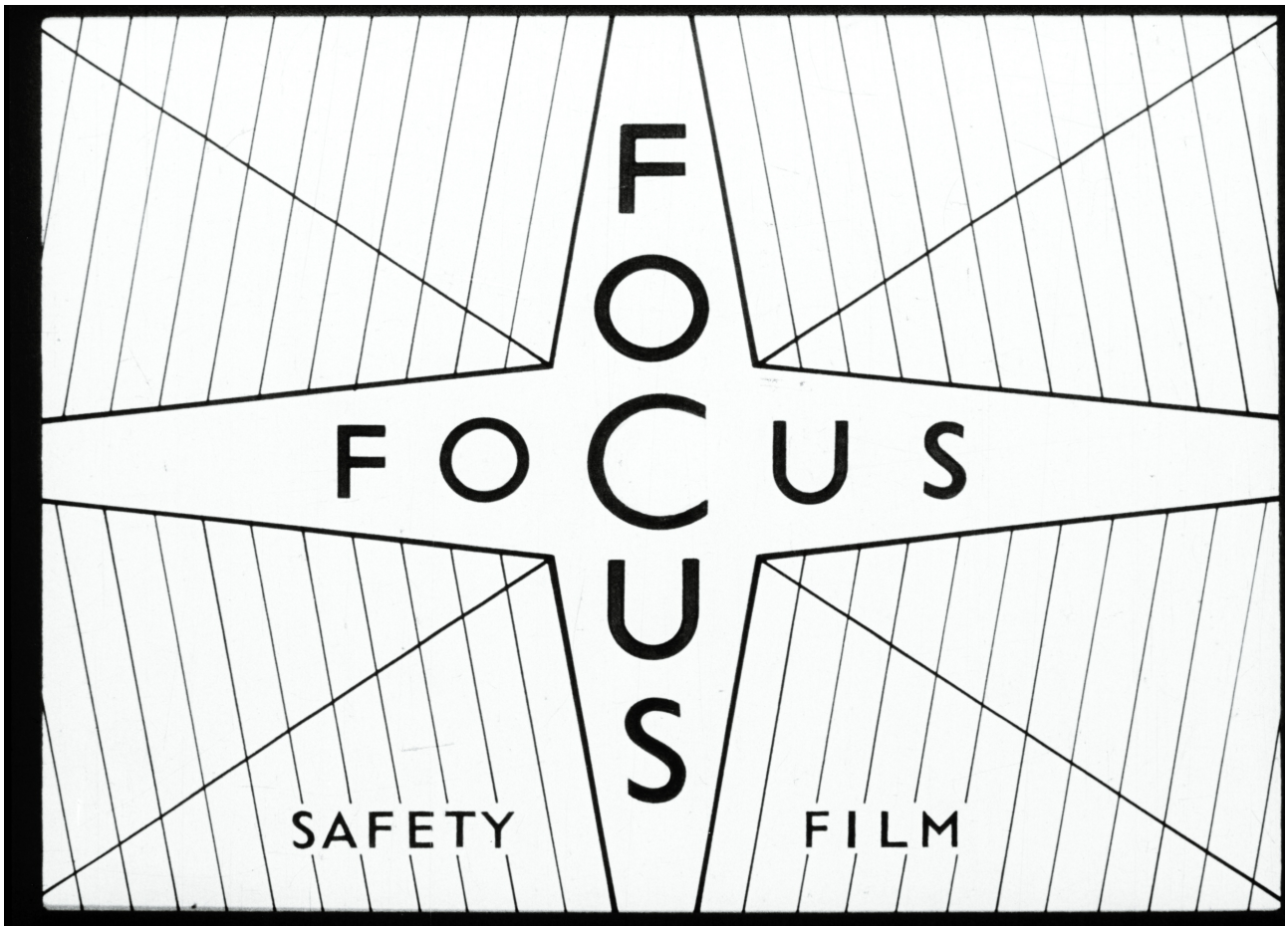

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CIVIL DEFENCE TRAINING BRANCH

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March 1953

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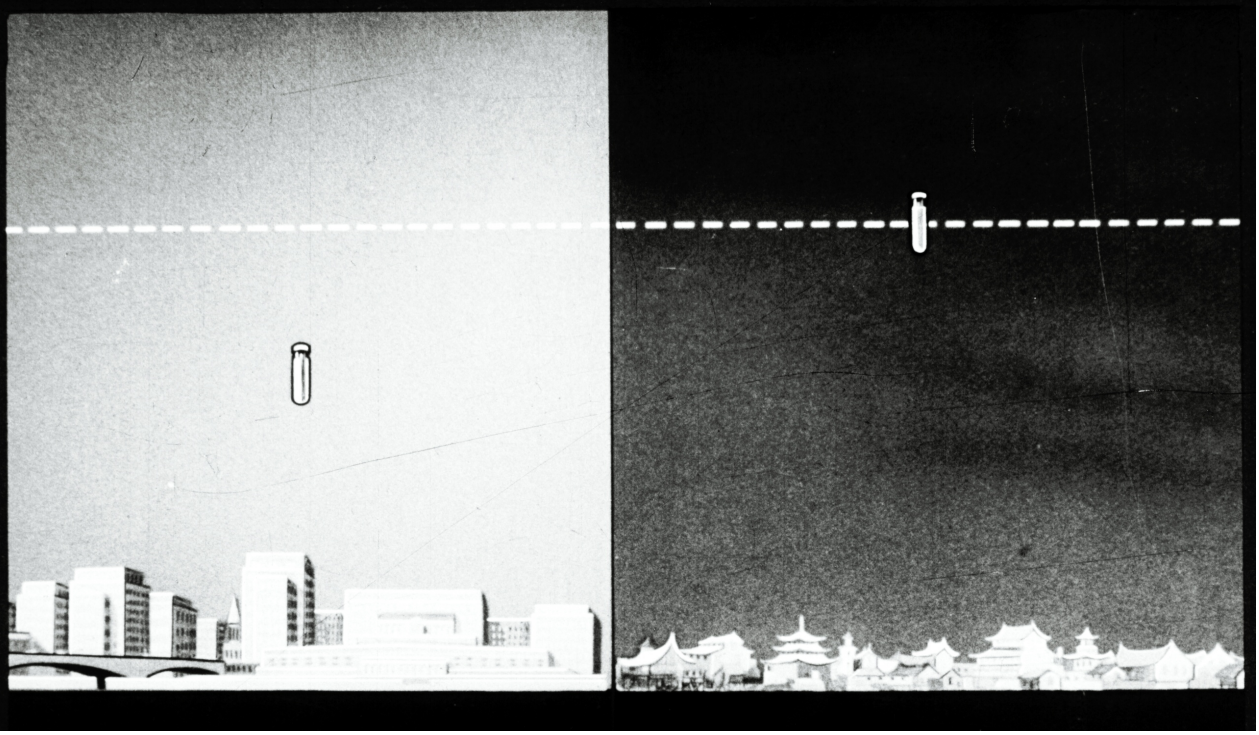

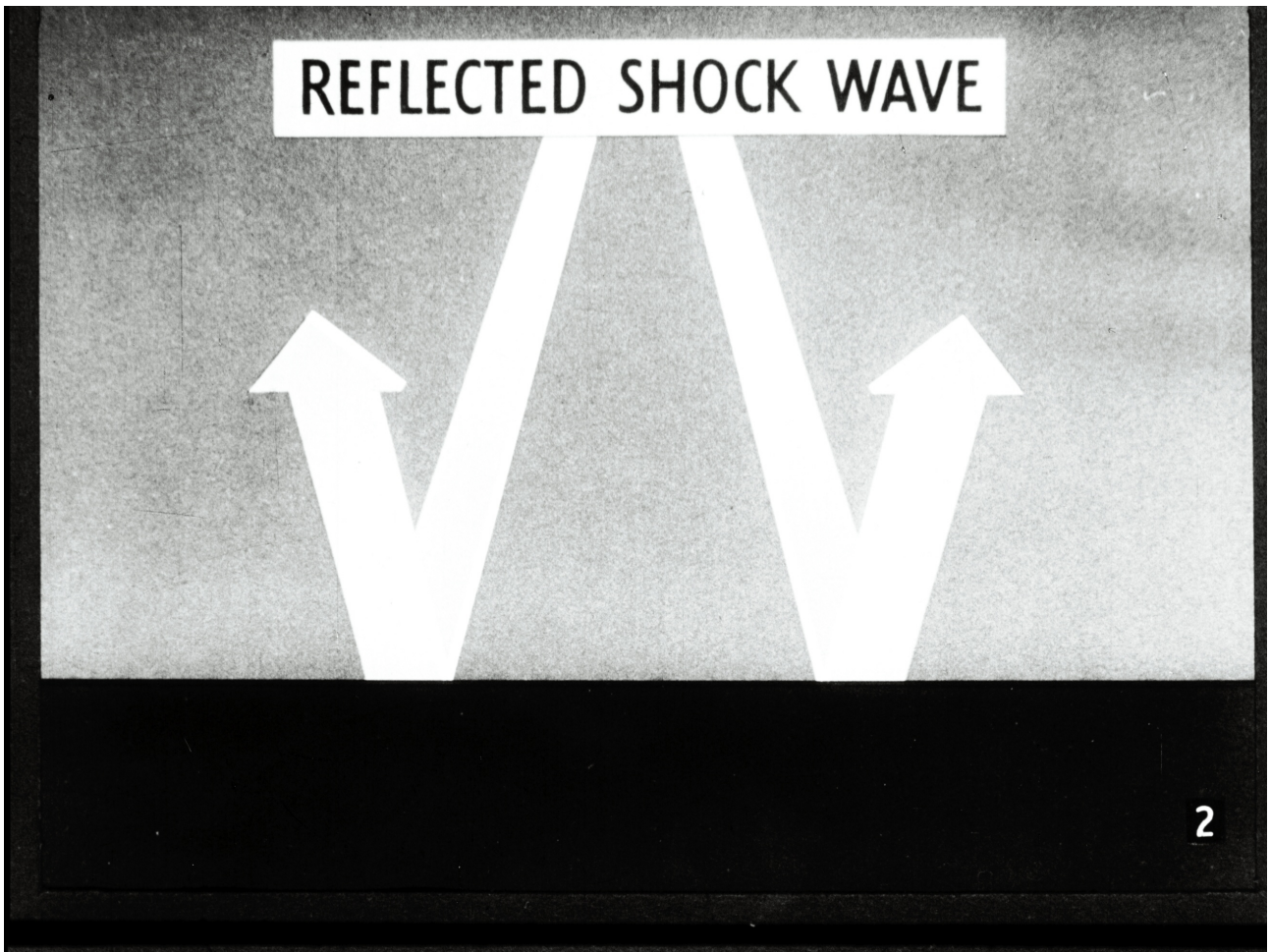
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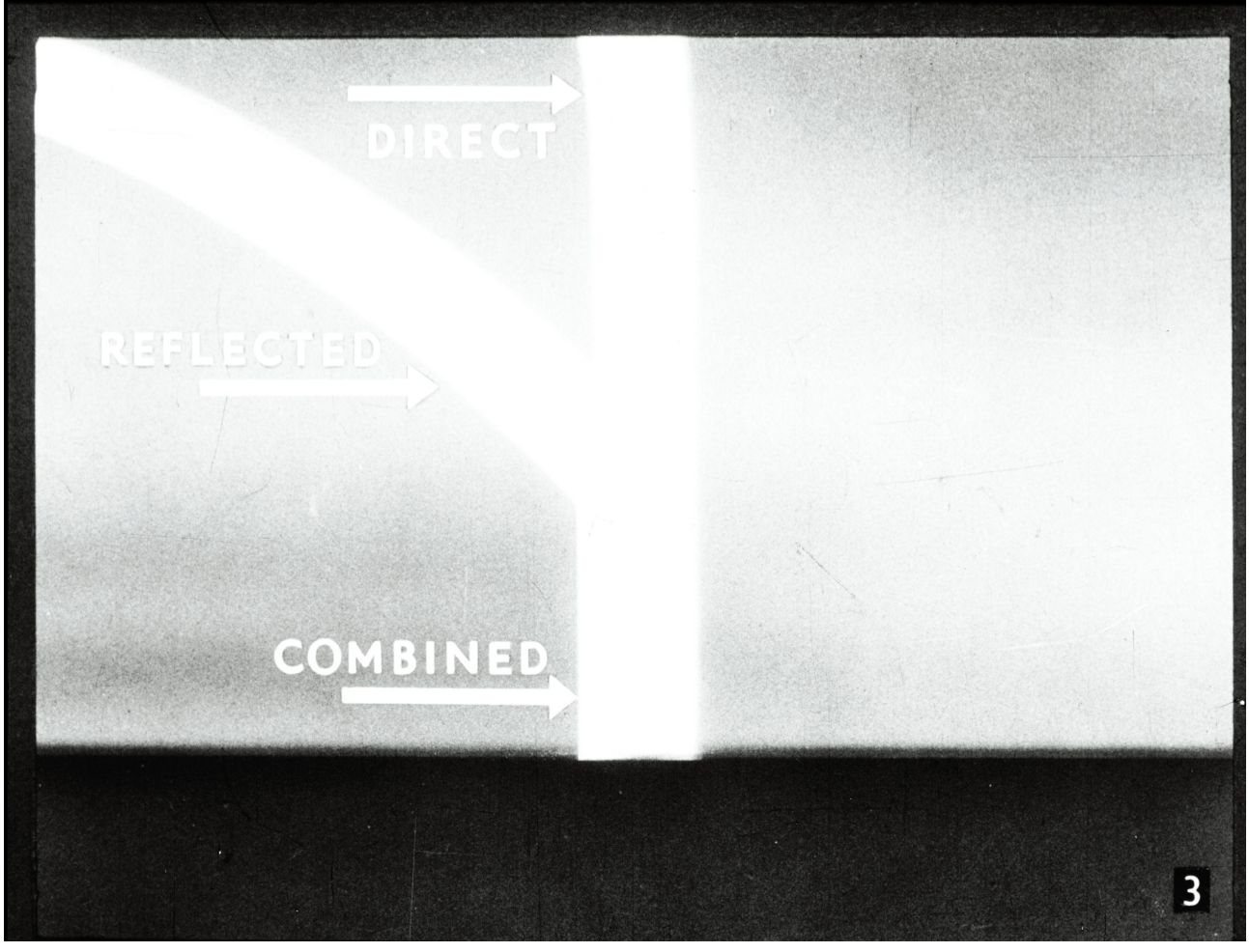
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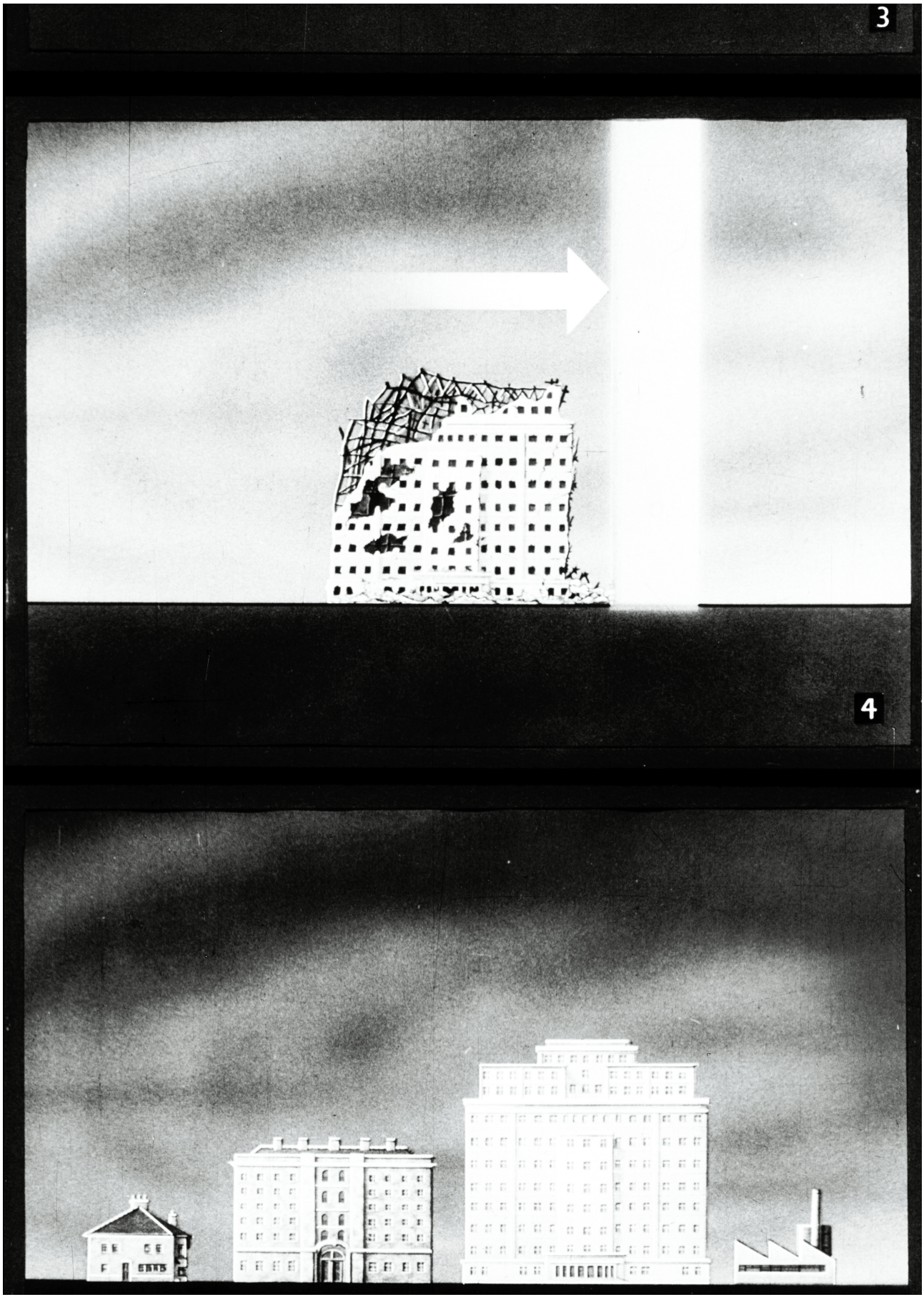
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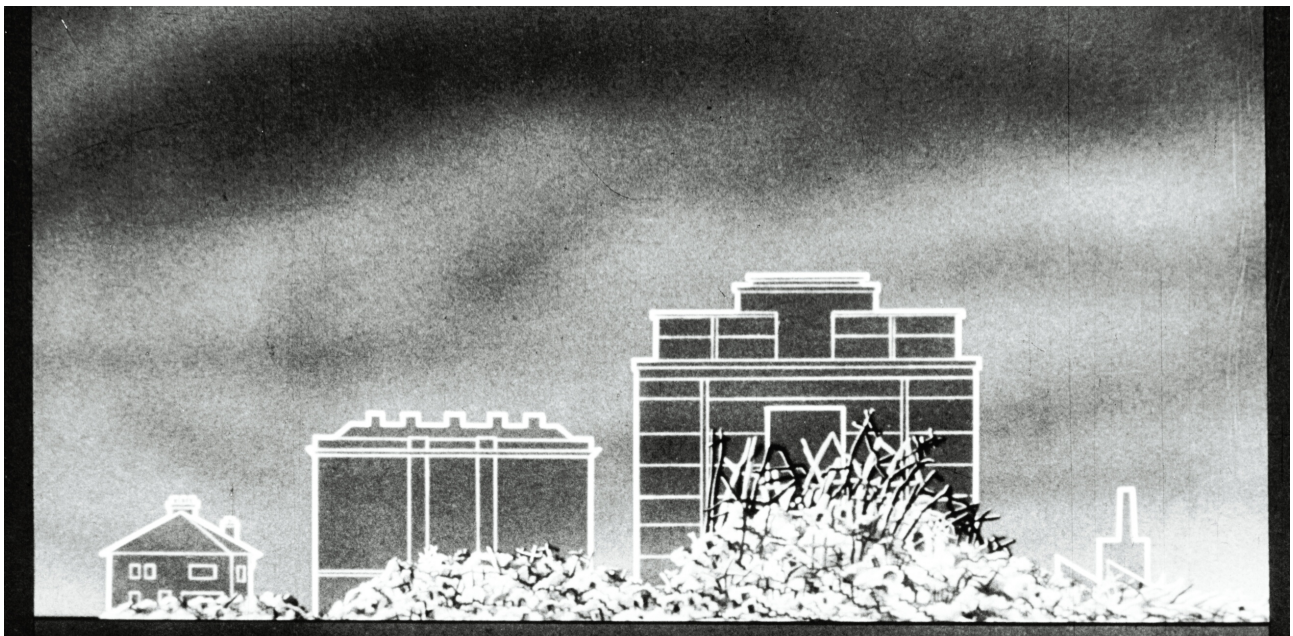
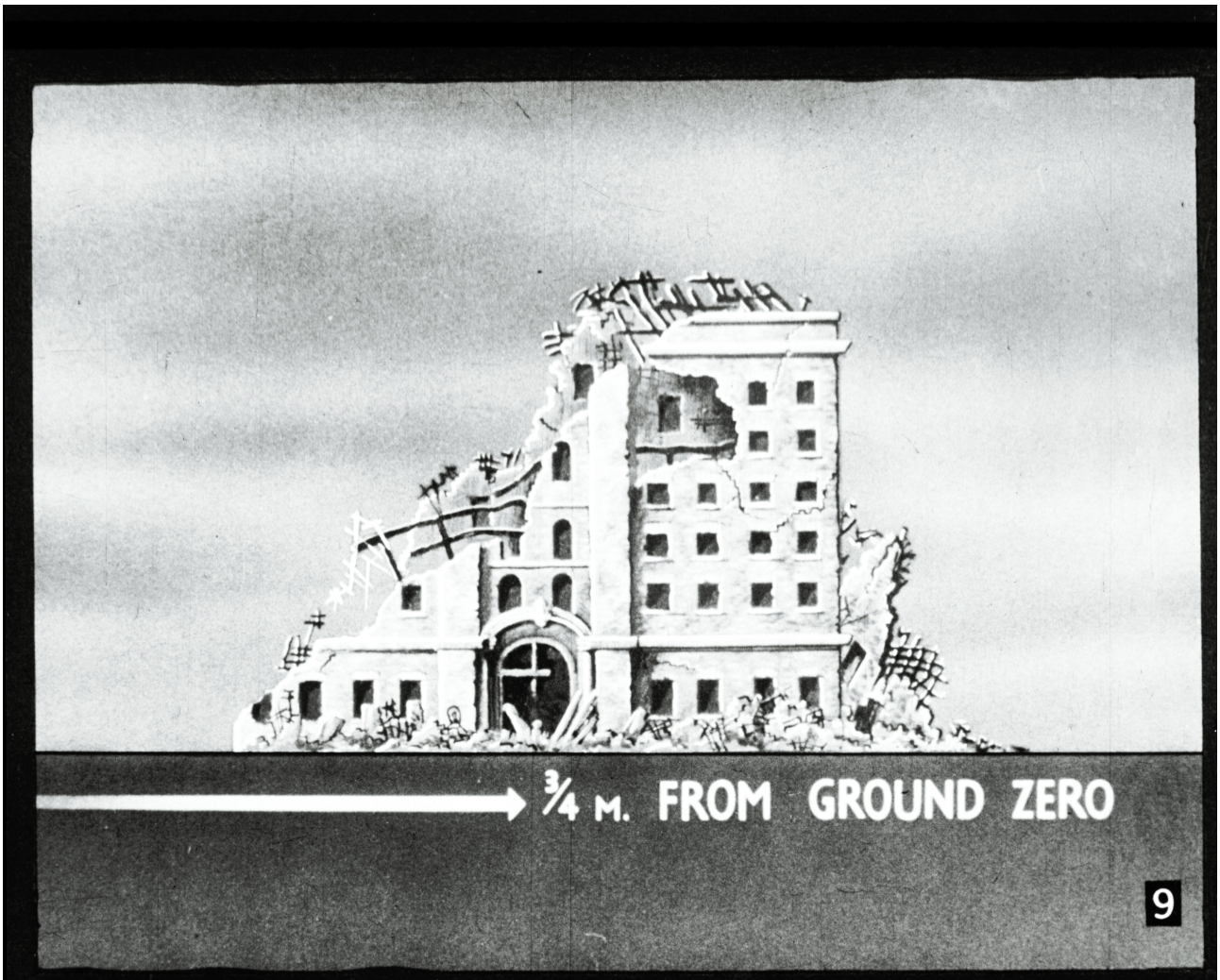


¼ M. FROM GROUND ZERO

7

¾ M. FROM GROUND ZERO

8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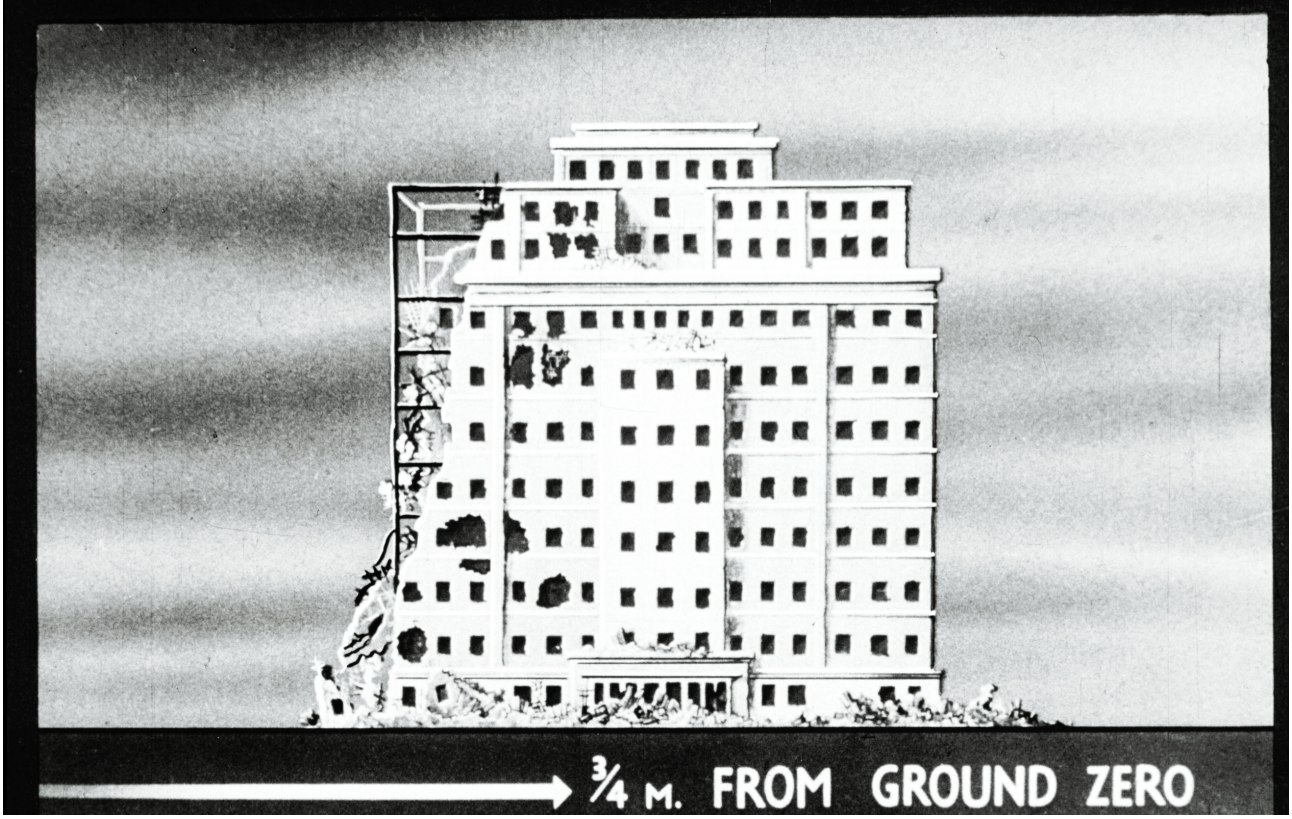
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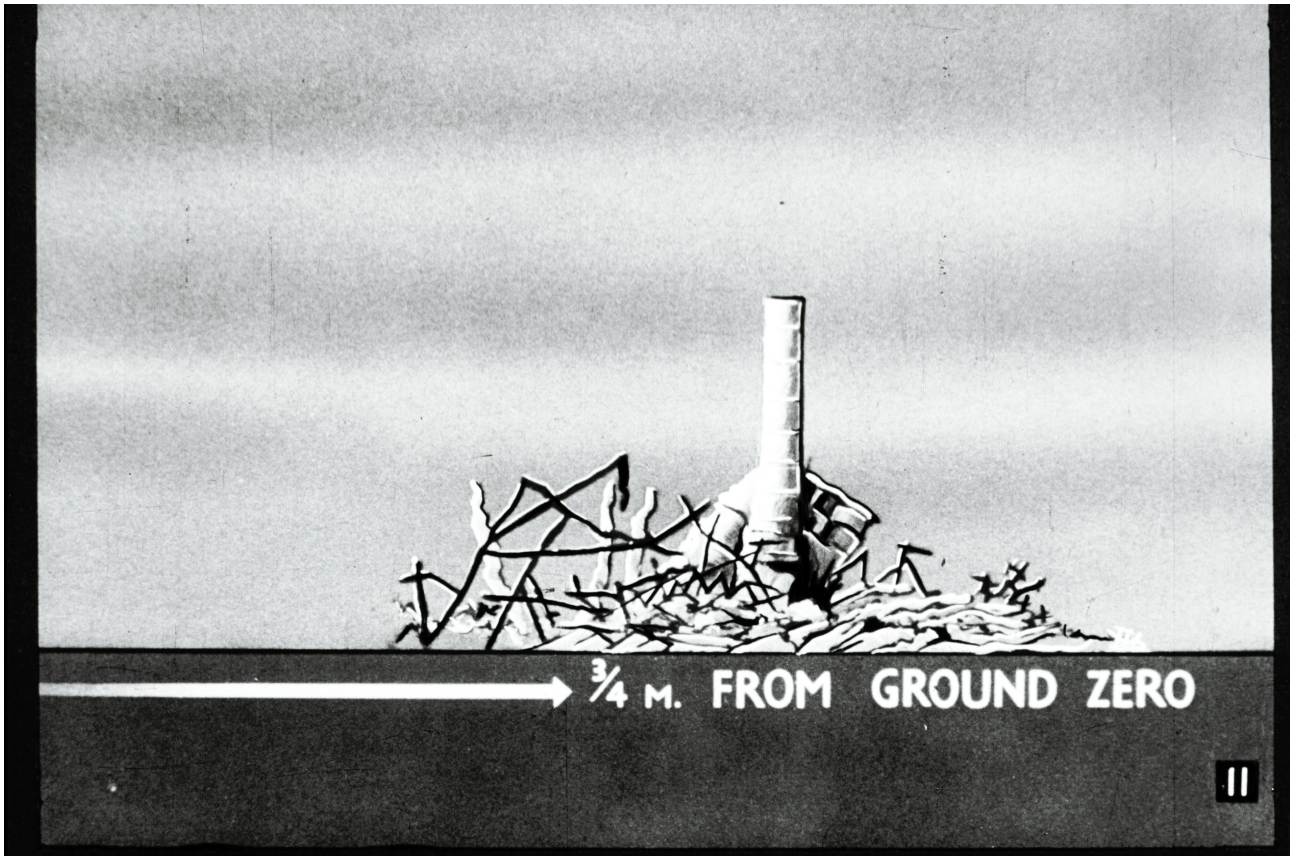
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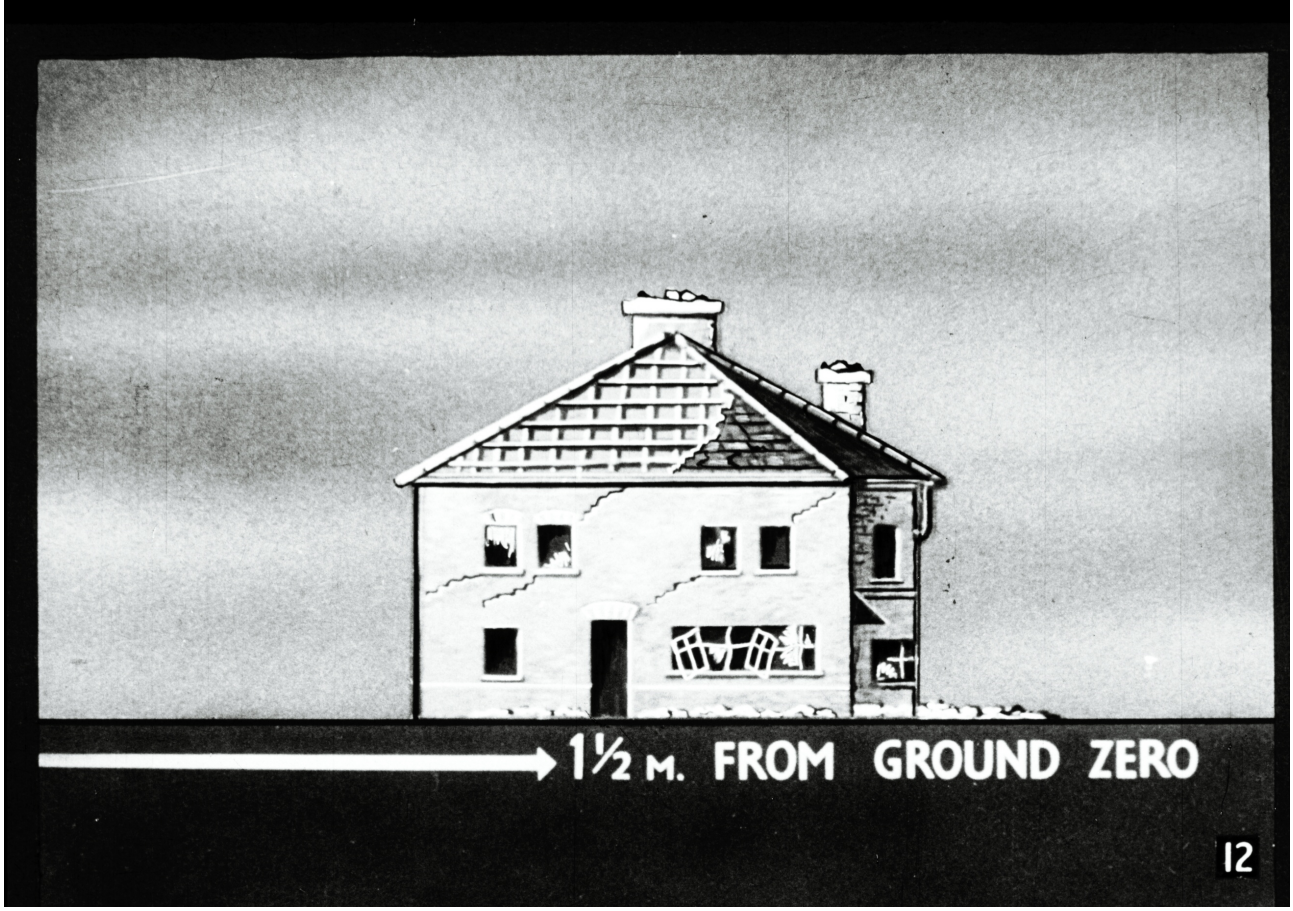
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1½ M. FROM GROUND ZERO
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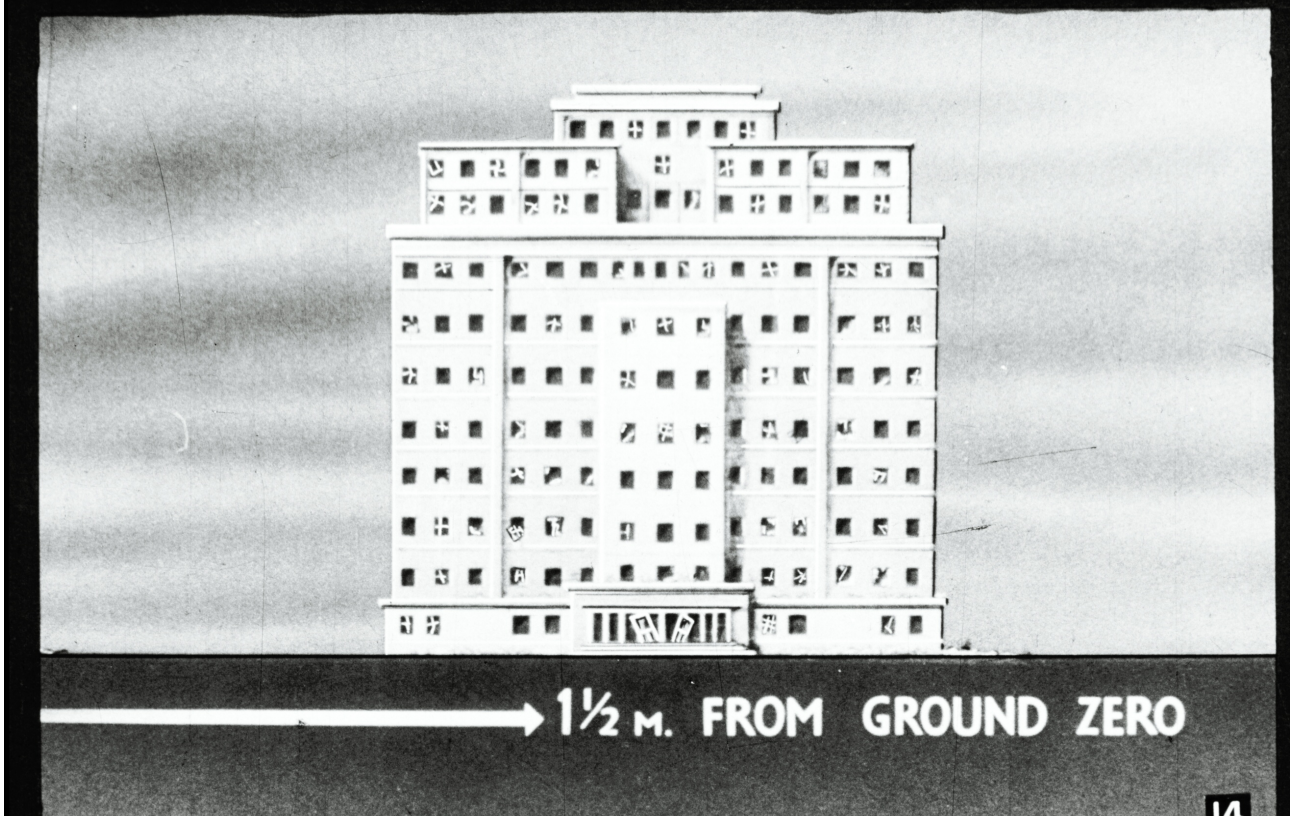
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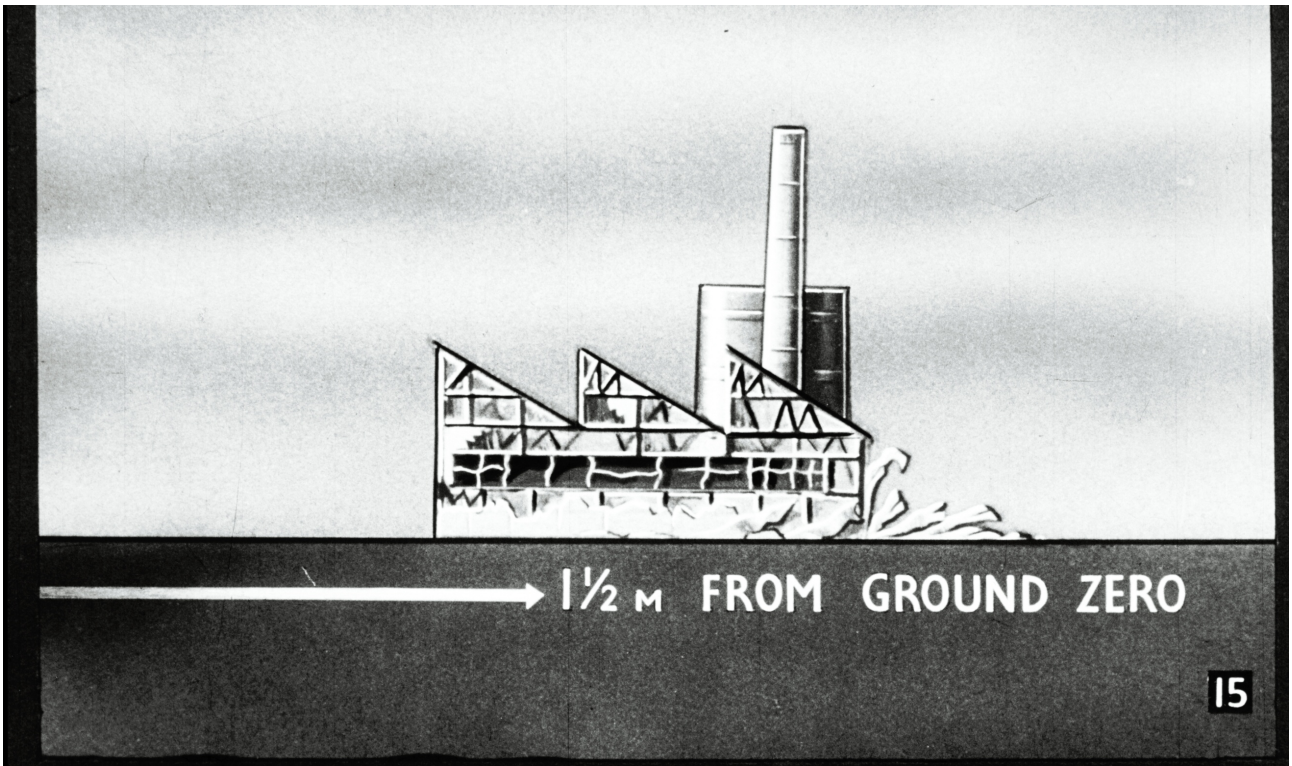
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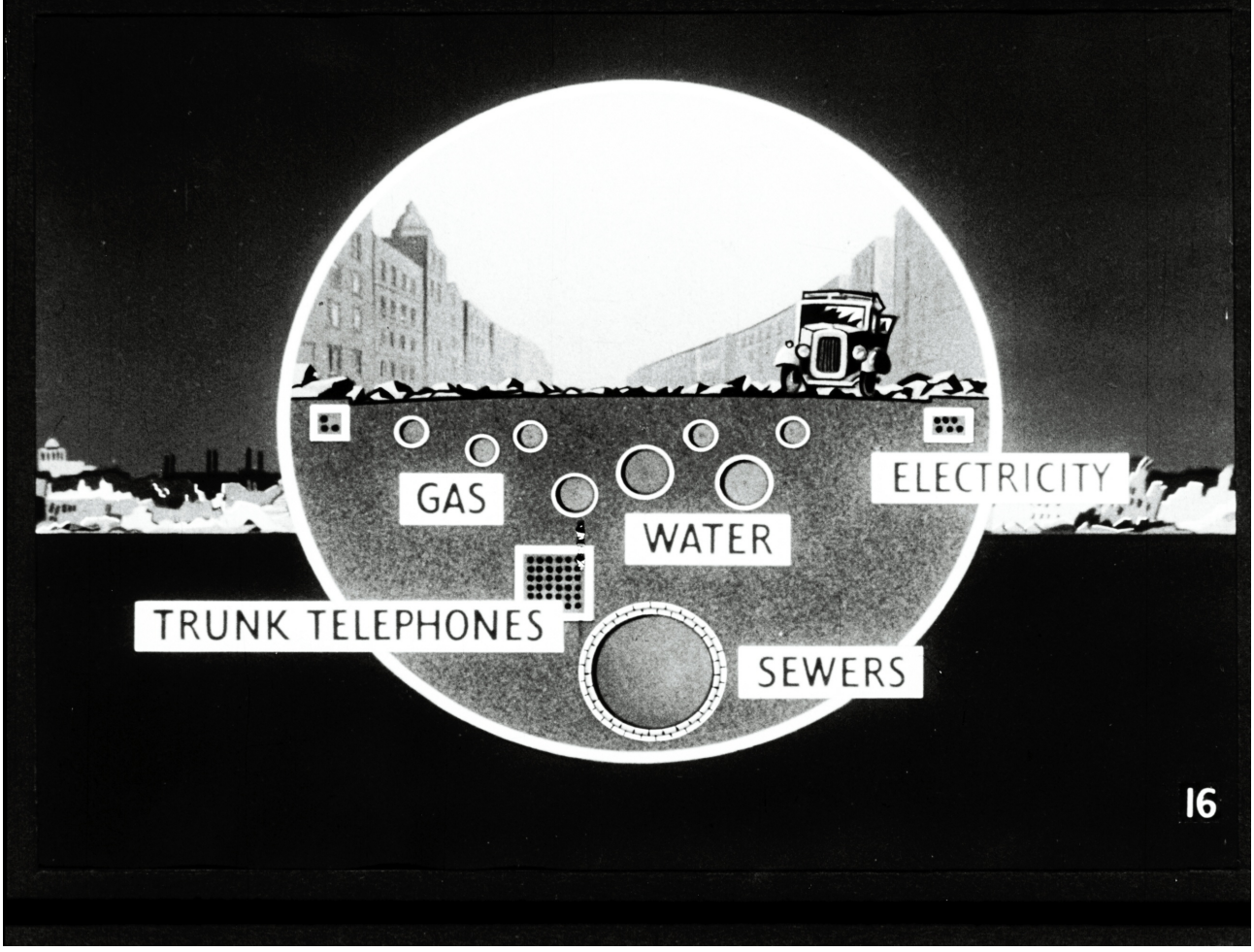
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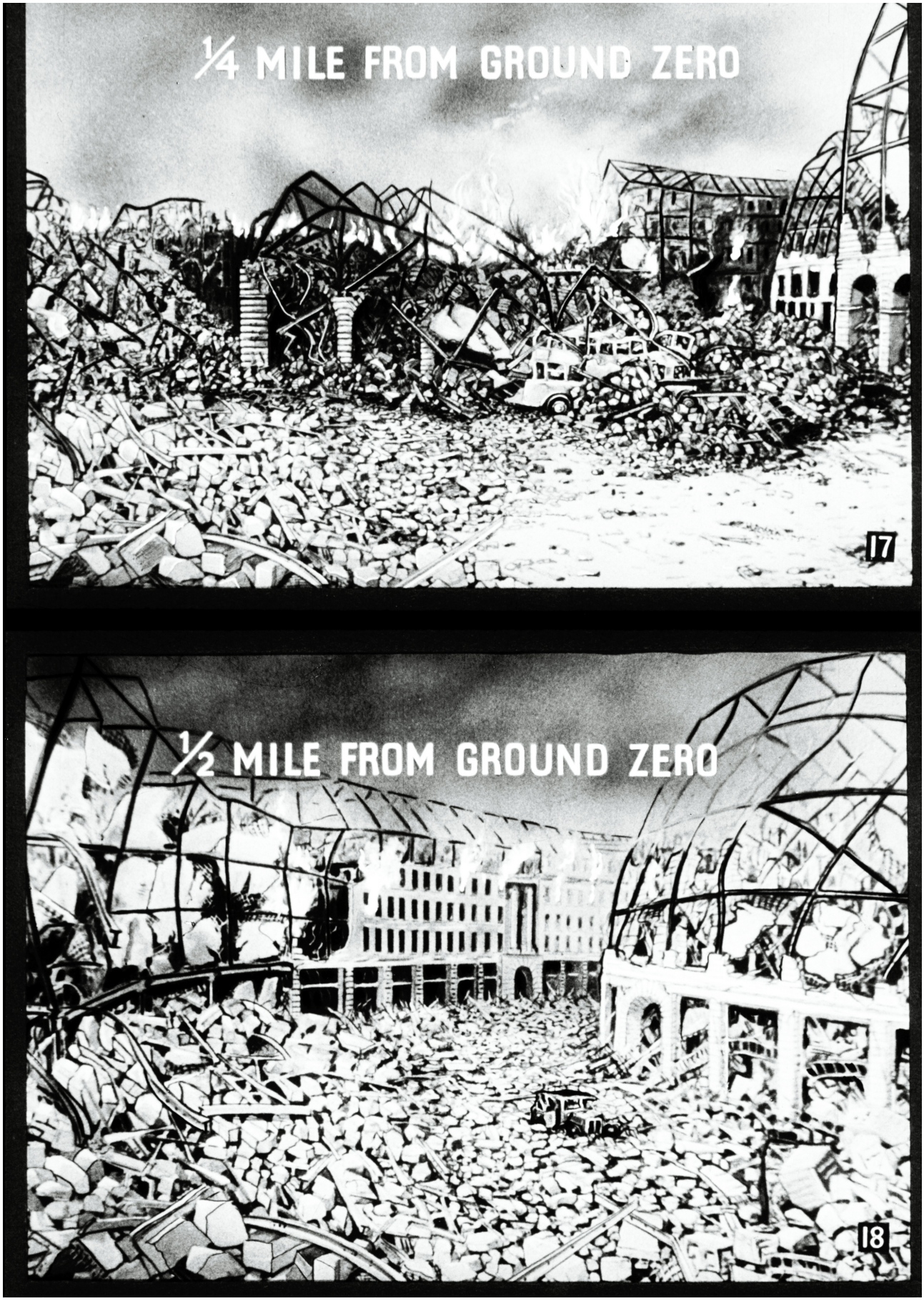
¼ MILE FROM GROUND ZERO
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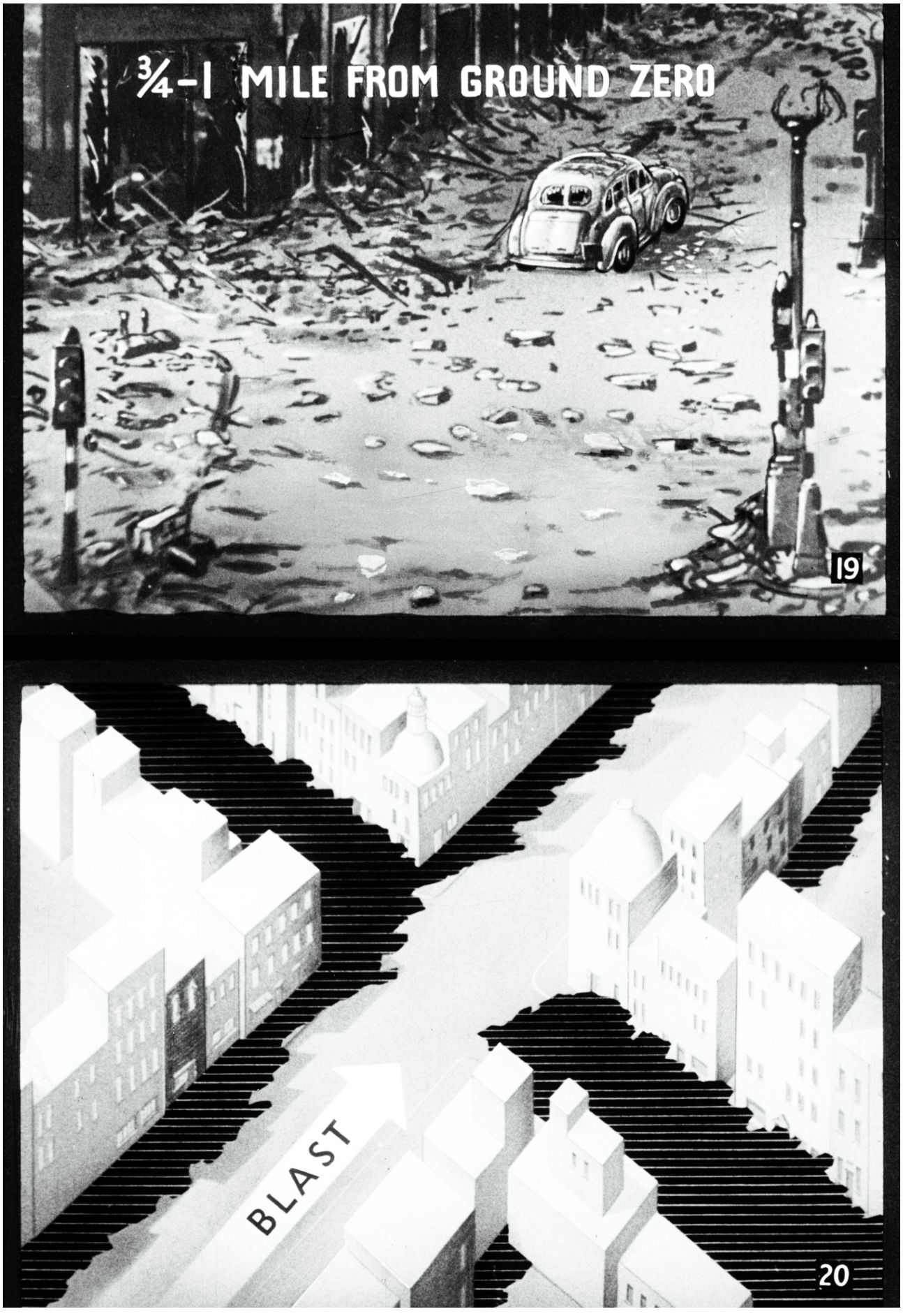
½ MILE FROM GROUND ZERO
18


¾-1 MILE FROM GROUND ZERO
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BLAST
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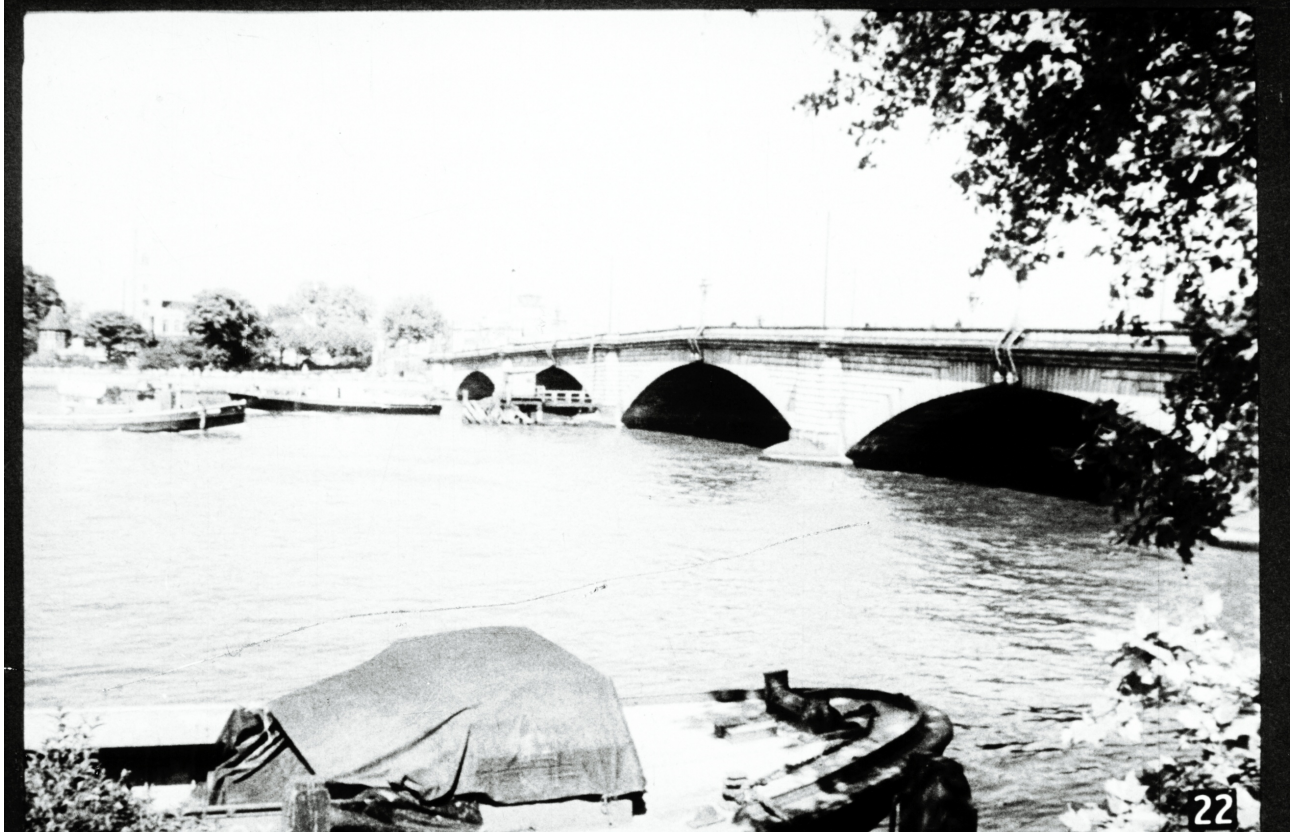
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